

transmitter 12 such that no transmitters are set to the same wavelength simultaneously. The wavelength selection is done based on the existing wavelengths propagating in the network. The same wavelength can be used in the same optical link 4 in
5 the multimedia MAN optical network 10 if another multiplex technique such as, but not restricted to, TDM (time-division multiplexing), is used. As mentioned, the optical network units (ONUs) and the neighboring POP units 6 in the multimedia MAN optical network 10 are aware of the network condition, time
10 division segmentation and wavelengths in use via the control channels that are broadcast by the POP units 6. The optical signal generated by the optical transmitters 12 are input to the optical link 4 via a WDM multiplexer 18. Therefore, each of the N optical input channels combined into the optical link are
15 carried by the bus link 4, N being the total number of optical channels active in the CAN network 10.

Each transmitter 12, also called multiple wavelength apparatus, enables the selection of a particular wavelength to be sent into the link 4. The selection of a particular
20 wavelength is made by a control system, as will be described below, according to the destination of the light pulses. For this reason, the CAN 10 is in effect a distributed or virtual switching system.

In the case of a tunable laser source, the latter is
25 modulated at a rate R' higher than the nominal data rate R of the payload and protocol overhead by a factor of K which depends

defined as one in which an ONU wants to communicate with another ONU and both ONUs share the same link 4. Referring to Figure 5, a CAN 10 comprises POP units 42 and 44 connected with the link 4. ONUs 46-56 are connected to the link 4 by means of optical communicator 58 and 60. Several wavelengths are also necessary on this case. As an example, assume that ONU 48 needs to communicate with ONU 56 using λ_1 for the transmission. At the optical communicator 58, the information will be directed in both directions. A portion of the power will reach the POP unit 42 and the remaining power will be directed toward the proper direction in the link and will reach the appropriate optical communicator 60 that will redirect the data traveling on wavelength λ_1 toward ONU 56. At the same time, ONU 56 can communicate with ONU 48 using another wavelength λ_3 . Assume there is a break of the link between the optical communicators 58 and 60. The bi-directionality of the system enables the data sent by ONU 48 to reach POP unit 42 and the data sent by ONU 56 to reach POP unit 44. In both cases, the data will migrate to the MAN level, be routed toward the proper POP units to finally reach the final destination. Before sending a data signal, ONU 48 sends a control signal to POP 42 that informs the network of its intentions. POP unit 42 then orders all optical communicators to adopt a configuration to properly route the data signal sent by ONU 48. The routing procedure is also applicable, using another wavelength λ_2 for connecting, for example, POP unit 42 to POP unit 44. In the CAN configuration,